

EXPRESS MAIL NO.:EL307822463US

DATE MAILED: October 5, 1999

PATENT

INVENTORS: Jennie CHING
Eric HSIAO
Peter S. LEE
Edith H. STERN
Barry E. WILLNER

DYNAMIC COMPOSITION AT THE SET-TOP BOX

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The invention relates to the field of transmission of video programs and more specifically to a system for presenting multimedia programs that is customized to a specific audience, which may be as granular as an audience of one.

2. Description of the Related Art

Providers of broadcast, satellite and cable television offer a variety of programming channels. In fact, it is common for many viewers to be able to choose from over one hundred channels, which are a combination of channels provided by national networks, by local cable providers and a variety of cable programmers. Many of the new television sets come with the capacity to receive more than a hundred channels. Local providers of cable television are usually granted exclusive rights to provide cable programming to a specific community,

EXPRESS MAIL NO.: EL307822463US

5 town, or defined locale. These providers are able to customize channel offerings
based on the geographic location of the subscribers. For example, a program
offering advice on "ice fishing" would most likely enjoy a higher viewer audience
in northern Minnesota rather than Southern Florida. And while providers of
television programs continue to offer more content, this increase in content is not
10 without its shortcomings.

One shortcoming is that the television programs are not customized to
individual viewer's demographics and taste. Stated differently, the program
content is not as focused as the providers of these programs desire. The amount
of selection a provider of a program can control is usually based on geography
alone. Accordingly, a need exists for a method and apparatus to enable the
providers of television programming content to customize their offering based on
criteria other than geography.

Another shortcoming with current television programs is that the program
content and advertisement content cannot each be separately customized. All
viewers within the same geography receive the same advertising and
programming content. Accordingly, a need exists for a method and apparatus
to enable the providers of television programming the ability to customize both
their program content and their advertisement content separately based on
criteria other than geography.

25 Another shortcoming of conventional television is the inability of the
providers of television programming to combine multiple sources of program and
advertisement distribution in a customized fashion. One solution known allows
user driven interaction with the Internet and the television to combine multiple
sources. One solution such as Microsoft's WebTV or Intel's InterCast allows a
30 user to view both television broadcast programs and surf the Internet on a

EXPRESS MAIL NO.: EL307822463US

5 television. This solution allows the viewing of several sources of information, but
does not combine the sources of information. In fact if the user desires to
combine multiple sources of information, the user must program a VCR or other
device to record information from a variety of sources such as broadcast and the
Internet. For many people the experience of having the program information
10 delivered passively rather than programming devices to receive and combine
information from a variety of sources is important. There is a need to retain the
passive viewing experience for a user, while allowing the providers of television
programming to combine multiple sources of program and advertisement
distribution (for example, broadcast, Internet, CDS, DVDs and other computer
15 readable material) in a customized fashion.

Moreover, all forms of broadcast and cable television program distribution
are limited by available bandwidth. There is currently no mechanism to combine
program material and advertisement from several different sources, or to store
information as directed by the program provider on a viewer system prior to being
20 displayed. Accordingly, a need exists for a method and apparatus to overcome
this problem.

Still, another shortcoming with current cable distribution system is the
inability to tailor program content based on the viewer. For example, a program
involving scenes for mature audiences, such as the known movie ratings of R or
25 NC-17 is not appropriate for small children, although the story line may be
appropriate. One example is the popular movie entitled "Titanic." The violence,
mature subject matter and adult scenes are not appropriate for children.
Providers of programming materials have no mechanism by which to tailor their
information to specific viewers such as children, adults or other criterion.

EXPRESS MAIL NO.: EL307822463US

5 Accordingly, a need exists for a method and apparatus to provide customized programming to viewers.

SUMMARY OF THE INVENTION

10 Briefly, in accordance with the present invention, a method for displaying on a viewer information processing system with an interface to a device for rendering audio video display, a set of multimedia segments to form a multimedia presentation. The method comprising the steps of: receiving a play-list, wherein the play-list is a list of instructions for rendering each of the multimedia segments, and the sequence of the multimedia segments in the play-list is directed by the provider of the presentation; receiving multimedia segments; and rendering the multimedia segments received based on the play-list.

15 In accordance with another embodiment of the present invention, an information processing system and computer readable storage medium is disclosed for carrying out the above method.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The subject matter which is regarded as the invention is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention will be apparent from the following detailed description taken in conjunction with the accompanying drawings.

FIG. 1 is a block diagram of a cable head-end and its customers.

EXPRESS MAIL NO.: EL307822463US

FIG. 2 is a block diagram of a cable company and its customers of FIG. 1 with receiving groups identified, according to the present invention.

FIG. 3 is a block diagram of a play-list according to the present invention.

FIG. 4 is a block diagram of the business relationships of the cable company of FIG. 1 according to an aspect of the invention.

FIG. 5A is a block diagram of a viewer unit, according to the invention.

FIG. 5B is a block diagram of a multimedia insertion into received program content.

FIGS. 6A and 6B are a flow diagram of the viewer unit of FIG. 5 inserting multimedia segments, according to the present invention.

FIG. 7 is a flow diagram of the creation of the play-list at a head-end of FIG. 1 according to the present invention.

DETAILED DESCRIPTION OF AN EMBODIMENT

However, it should be understood that these embodiments are only examples of the many advantageous uses of the innovative teachings herein. In general, statements made in the specification of the present application do not necessarily limit any of the various claimed inventions. Moreover, some statements may apply to some inventive features but not to others. In general, unless otherwise indicated, singular elements may be in the plural and visa versa with no loss of generality.

Definitions:

The following definitions are utilized in this document:

EXPRESS MAIL NO.: EL307822463US

5 group addressing - the process of sending out an identical play-list to one or more clients based on the demographics of the members of the group, such as age, gender, income, zip code, weather, or other factors an advertiser or program provider would use to group audiences.

10 provider - one or more entities or companies that provide the play-list, the multimedia segments for a presentation and the group addressing.

viewer information processing system - any thing that can process data or information including microprocessor machines such as PCS and set-top boxes. The viewer information processing system can be logically and physically distinct from a cable set-top box, TV or integrated into one unit.

15 multimedia segment(s) - a multimedia segment is a portion of a multimedia presentation. Multiple segments are rendered to form the complete program. Examples of segments include the following: 1) long video track; 2) audio track; 3) an audio/video track; 4) an audio special effects track; 5) a short video scene, or still images; and. 6) video special effect track, such as post-production product placement. These segments are combined to form the multimedia presentation. Segmenting the multimedia program in this manner allows the delivery of voice tracks in different languages, as well as different video segments that are age or culturally appropriate.

20 play-list(s) - a list of instructions for rendering each of the multimedia segments. The play list is typically managed and changed by the provider of the presentation. A play-list can be thought of as a "bill of materials" complete with the order for assembling the multimedia segments for a presentation.

30 Overview of Cable Head-End

5 Referring now in more detail to the drawings in which like numerals refer
to like parts throughout several views, as described in FIG. 1, there is shown a
cable head-end 1 coupled to a plurality of customers (or viewers) 4-7 and 9,
each represented by a house icon. Note, the use of a house icon here is not
meant to limit this embodiment to households only. It will be understood to those
10 skilled in the art the household can also be an entity such as a company. A
cable head-end 1, which is connected via a satellite dish 2 and a landline 3 to
receive television program materials and digital services, command and control
information, and attachment to networks and services such as the Internet.

The output from the cable plant 1 is typically transmitted through a hybrid
fiber coaxial network 10 which is organized in a tree and branch structure,
passing homes in the community. The icons representing homes 4, 5, 6, 7, and
9 represent cable customers, shown by connection to the cable plant 11. The
home 8 is not a cable subscriber and hence is not connected to the network 10.
According to one aspect of the invention, the cable company at the head-end 1
can transmit program content (e.g., television programs) and play-lists to
coordinate the display of the multimedia segments received at viewers' units
(e.g., a set-top box coupled to a television receiver or an information processing
apparatus with a display). A programming distributor will generally obtain
information from, or about, its customers that is of great use to program providers
and advertisers. In today's broadcast television environment there is no
possibility for directing signals at an individual viewer's unit. In the system of FIG.
1 the cable head-end 1 can transmit play-lists that are recognized at the viewer's
unit and used to select multimedia segments for display to the viewer. Thus, the
system topology shown in FIG. 1 also represents a new business model for
tailoring and delivering multimedia segments in a network such as a cable

EXPRESS MAIL NO.: EL307822463US

5 network or a public data network such as the Internet. This business model enables the following offering. It enables the cable head-end 1 to now tailor and charge for multimedia segments tailored to a viewer. For example, an advertiser may buy "1234 Any street" between 6AM and 5PM to show commercials for toys.

10 The cable head-end 1, a provider, can now be a provider of the "doctor show channel", created for medical enthusiasts. The cable head-end 1 would create a play-list that stitched together any broadcast shows with medical content, potentially select a choice based on user demographics or preference if two shows are available at the same time, and transmit content owned by the cable head-end 1 to the set-top over the internet for play when no broadcast satisfies the conditions.

20 In another example, the provider can provide programs customized for many different audiences with only an incremental use of bandwidths (e.g. frequency spectrum, or megabits per second) over broadcasting a single program in common for everyone. Consider the case where the program material is customized for the following audiences - young women, middle aged women, and older women. Ninety five percent of the program content (multimedia segments) is common for these three audiences, representing material of general interest to women, and women's issues. Program material (multimedia segments) that is specific to the different groups, for example, 25 information on cosmetics for teenagers, child-rearing, or retirement planning, composes the other 5% of the content, and represents the customization geared to these audiences. The provider, by sending the appropriate play-lists (and potentially multimedia segments) to members of these groups, can effectively provide three different channels using only 10% more bandwidth than a single 30 channel.

5 In another example, a play-list may cause a tailored message to a specific viewer. A child may be watching an episode of a children's program, such as Barney or Sesame Street and the play-list indicate a multimedia segment containing audio of the child's name to be rendered along with the multimedia segment containing the audio track.

10 Delivering the Multimedia Segments and Play-lists

There are several ways in which the cable head-end 1 can ensure the multimedia segments are available at the homes. The multimedia segments and play-lists can be downloaded to a set-top box with storage capabilities through the cable; they can be distributed via a form of removable media, such as CDS, DVDs, or tape; they can be broadcast over the air to an apparatus with storage capabilities and they can be sent over the Internet, or over another telecommunication means, wired or wireless.

20 The providers of content can sell content based on any useful marketing criteria such as geography, gender, age, zip code, political affiliations, number of children, marital status and other demographic information including interests.

Embodiment of Providing Customized Advertisement

25 FIG. 2 shows receiving groups in the neighborhood comprising homes 4-9. Group 20 is composed of houses 4 and 9; group 21 is composed of houses 7, 5, and 4; and group 22 is composed of houses 6 and 4. Group advertising is the delivery of multimedia segments and play-lists to members of a group. By way of example, group 20 is "addressed" by a beer company to advertise its major brand. The advertising agency of the beer company contracts with the cable company to show 100 impressions of a beer ad to houses 4 and 9. The

EXPRESS MAIL NO.: EL307822463US

5 advertising agency has already determined a high likelihood of beer consumers
in households 4 and 9, and therefore contracts with the cable company to deliver
their beer commercial to optimize for maximum effectiveness in encouraging
beer purchase in those households. Similarly group 22 has been "addressed"
by a diaper company to advertise its major brand. The advertising agency of the
10 diaper company contracts with the cable company to show 30 impressions of a
diaper ad to houses in group 22, having determined that 30 is the optimum
number of repetitions to encourage diaper purchase in homes with infants.

Embodiment of a Playlist

Turning now to FIG. 3, shown is a block diagram of a simple play-list 300,
which describes a user selectable channel according to the present invention.
As stated above, the play-list 300 is a series of pointers to multimedia segments
that are combined by the customization device to form the presentation. A
pointer 302 to a segment is the first entry in the play-list 300. The pointer
indicates where the segment is stored, or from where the segment is available
20 (e.g. broadcast stream channel/time, computer readable medium, internet
address). The date of the presentation is shown in column 304 in day-of-year.
In column 306, the time the segment is to be rendered is shown in hours,
minutes, seconds and frames. Column 310 indicates the rendering instructions,
that is, a pointer to a device or software that will appropriately render the
25 multimedia segment. For the first segment, the rendering is to be standard
video. For the second segment, the rendering is to be video, with an additional
audio overlay track expected. Segment three is an audio segment to be overlaid
over the second segment, as indicated by the time and duration fields. In column
30 312, is required segment availability. That is, this column indicates whether the

5 segment is expected to be first available at the time it is scheduled for rendering, or whether it should be resident locally and at what time prior to play. This is an exemplary play-list only. To those skilled in the art, several other forms of play-list are possible including the elimination of entries 310 and 312.

10 In order to synchronize the rendering of the multimedia segments specified by play-list 300, and the actual delivery of multimedia segments to a household, time must be synchronized between the user Devices and the provider. This may be done by time synchronization codes (not shown) or by other means such as household access to a GPS clock. Synchronization codes can be sent to the household by satellite, broadcast or the Cable TB infrastructure.

Embodiment of Selling Advertisement

15
20
25
30
FIG. 4 shows the business relationships involved in a business model in accordance with the invention. Companies 30 with products to sell have a relationship with advertising agencies 31. The advertising agencies and the companies 30 select the best "advertising venues," in this model, the best demographics, neighborhoods, and individual households to which the advertising should be targeted. The agencies 31 have a business arrangement with cable companies 32 which have as subscribers those households selected. The cable company has a relationship with cable programmers and other content provider's (33). The cable company 32 agreements specify which commercials may be provided at the households, and which should remain untouched as provided with the channel or programming. For example, it may be that channels 50-80 are candidates for personalized household commercial playback, but no other channels are. It may be that only selected time slots on various channels

are permissible to use for personalized household commercial playback. The cable company 32 also has a relationship with its subscribers, in households 34.

An Embodiment for Customized Programs

FIG. 5A shows an customization device 41, for program customization based on a play-list. In the household, it is a playout device 40, such as a television receiver, a set-top box 43, and an customization device 41, for storing the play-list, performing multimedia rendering as directed, and storing program materials as appropriate. The device 41, for program customization may be implemented as a part of the set-top box 43, or as a standalone unit coupled thereto. The set-top 43 is connected via coax 42 to the cable company 32. The device for program customization 41 is connected either directly to the coax and thereby to the cable company, or indirectly through the set-top box 43, or other suitable connection means.

FIG. 5B shows more detail on the customization device 41. The device 41 contains a means for command and control 51 (e.g., a microprocessor), a working memory (e.g., RAM) 52, and storage for multimedia segments (e.g., a hard disk drive) 50. It also contains other storage 53 for other information such as play-lists 300, algorithms and logs, and a connecting bus 54. The storage 53 can also be used to store computer-readable instructions for adapting the device 41 to operate according to the invention. The device 41 can be implemented as a specialized device or a programmable information handling system such as a personal computer. The customization device 41 can include a removable storage device such as a CD ROM drive 55 for receiving CD ROMs 56 or other machine readable media containing the multimedia segments (the machine readable media can take the form of tangible media or an information signal

EXPRESS MAIL NO.: EL307822463US

received over a network). The customization device 41 can optionally include a network interface 57 enabling it to receive data and instructions over the network. The device also includes an output unit 58 for outputting the provided program in a proper format (e.g., NTSC, PAL, MPEG2) and appropriate modulation and control information. In the case of digital transmissions, using multiplexed digital streams, the device 41 will perform de-multiplexing, splicing, insertion and re-multiplexing as necessary. All of the components included in the customization device 41 can also be implemented in a set-top box 43 or a suitable television receiver. The various devices shown in FIG. 5B are all shown coupled to a bus 54 but other connections and well known devices may also be included and have been omitted for purposes of simplicity.

Insertion of Multimedia Segments from Playlist on Viewer Unit

FIGS 6A and 6B are a flow diagram 600 of the customization device in FIG. 5. For purposes of simplicity, the flow diagram describes the configuration where the customization device 41 and the set-top box 43 are packaged together. In the flow diagram 600, we refer to this combined device, 41 and 43 as the set-top box 43. The process begins with steps 602 and 604, where the set-top box 43, receives a play-list 300 from a head-end 1. In step 606, a check is made to determine if the play-list 300 is valid. The check is a checksum check, parity check or other error detection and error correction algorithms. If the play-list 300 is not valid, in step 608, the unit can wait for a rebroadcast of the play-list 300 or notify the head-end office through a back-end link, such as the Internet that the play-list 300 is invalid (not shown). Once a valid play-list is received, Step 610 determines if additional materials are needed to render the multimedia segments listed on the play-list 300. If additional material is needed to complete

EXPRESS MAIL NO.: EL307822463US

5 the play-list 300, the set-top box 43, requests information from other sources including, computer readable mediums such as CDS, DVDs, the Internet or through other telecommunication and cable channels. Potentially in parallel with these steps, in step 614, the set-top box 43 receives and locally store program materials. In step 616, the process checks if the materials are complete and
10 valid. If the materials are not valid, step 608, the set-top box 43 waits for a rebroadcast of the materials until valid (not shown). Once the combined set-top box 43, receives the viewer's choice of channel, step 618, the play-list 300 for that channel is invoked in step 620, and the program delivered.

In another embodiment, the steps 614 and 616 of storing the information are eliminated, and all of the information is available in realtime through a computer readable medium or through broadcast or other telecommunication. It is important to note that the play-list 300 can combine multimedia segments from a variety of sources.

20 The combined set-top box 43, may also be optionally required to check that materials represented on the play-list 300 are available at some customizable point before the time required by the play-list 300. That is, if material M, to be available locally from the combined set-top box 43, is scheduled on the play-list 300 for 2PM, the set-top box 43 may be required to verify at 1PM that the Material M has been received and is available. Failing
25 such a check may require the set-top box 43 to alert another device or entity, or to take remedial action. These sources include broadcast television, the Internet, CDS, DVDs and any other telecommunications and cable distribution and computer readable mediums.

30 Play-lists 300 may be supplied for each viewer selectable channel on the viewing device. For example, given a television with a 100 viewer selectable

EXPRESS MAIL NO.: EL307822463US

5 channels, the associated customization device can have a separate play-list 300
for each of the 100 channels. When a viewer turns on the television, and selects
a channel, the associated play-list 300 will become active. Thus, the play-list
300, unlike a traditional television channel, is not bound to a singular broadcast
10 stream at a fixed frequency in the broadcast spectrum such as channel 2. The
play-list 300 can automatically surf many channels for the viewer to create
customized programming. For example, a user wanting to watch news may
select a customized channel which shows at 6 p.m.; the news broadcast on
channel 2, at 7 p.m.; the news broadcast on channel 5 at 8 p.m.; and the
newsfeed at online URL www.cnnfn.com at 10 p.m. The user does not control
this assembly -- rather, it is a "news channel" he or she has selected. Stated
differently, the programming material is compiled from different sources at the
user's location in time for viewing. These viewer selectable channels are
composed from a multiplicity of multi-media segments transmitted both prior to
and concurrent with viewing, potentially via a plurality of networks as directed by
20 the play-list 300.

In an alternate embodiment, the program customization 41 may optionally
be required to acknowledge to the provider of the play-list 300 that it has been
received. Play-lists 300 may cover any time period, with different play-lists 300
for different viewer selectable channels being refreshed at different times. For
25 example, the play-list A associated with channel A may describe how to create
channel A from midnight on one day to midnight of the next. The play-list B
associated with channel B may describe how to create channel B from noon one
day to noon the next. The play-list C may be refreshed every 8 hours, to create
channel C. Play-lists 300 may identify multiple multi-media segments to be
30 synchronized for playout. For example, video may be obtained from live

EXPRESS MAIL NO.: EL307822463US

5 traditional broadcast, with audio obtained from a previously received file received
from a different transport network, such as the internet. The play-list 300 may
indicate that the files are to be played out synchronously. An application of this
would be a video mail merge for advertising - that is, a new car ad could play out
for all viewers with an audio track unique to the specific household "And this
10 week, just for you John Doe, this new car can be yours for \$25000". The portion
of the audio track that specifies "John Doe" could be received as a separate
audio segment to be synced with the portion of the ad where it is called for.

Creation of Play-list 700 at the Head-end

Turning now to FIG. 7, shown is a flow diagram of the creation of the play-
list 300 by the program provider, according to the present invention. In the flow
diagram 700, the place where the program provider creates the playlist is
referred to as the Central Channel Authority (CCA). In FIG. 7, we continue the
convention of FIG. 6 where a combined set-top box 43 and customization device
41 is referred to as the set-top box 43. The CCA determines the composition of
a channel, steps 702 and 704. The CCA determines which multi-media
20 segments are to be received at each group of combined set-top box 43, as
identified in FIG. 2 above. These set-top box 43s in each group are group
addressed for a play-list 300. In steps 706 and 708, the CCA determines which
multimedia segments are to be received prior to the scheduled viewing and
initiates transmission via a broadcast or distribution through computer readable
medium, such as the Internet, CDs and DVDs. The playlist includes addresses
and instructions on how the multimedia segments that make up the play-lists 300
are accessed. The play-list 300 is sent to the group addressed set-top boxes 43,
25 steps 712 and 714.
30

5

Business Models for Providers of Play-lists

10

This invention enables several other new business models. The business entity which creates the play-list 300 may be different from the broadcast entity. For example, an enterprise may desire to get into the business of supplying play-lists 300 for medical enthusiasts ("the doctor show channel"). Such play-lists 300 could stitch together any broadcast shows with medical content, potentially select a choice based on user demographics or preference if two shows are available at the same time, and transmit content owned by the enterprise to the set-top box 43 over the internet for play when no broadcast satisfies the conditions.

20

Another business model enabled is the following. A broadcast channel could use one frequency allocation to provide multiple viewer selectable channels. For example: for prime time viewing on channel A, the broadcaster could supply five channels - a young female interests, an older female interests, a male interests, a child's interests and a family interests. The broadcast content on the channel A frequency would supply a large part (say 95%) of the content for each of the viewer selectable channels. Key scenes would differ for each of the different channels, with the correct scene supplied over the internet or having been previously supplied on the same channel during a time when the channel is off the air and retained by the set-top box 43. The play-list 300 associated with the viewer selected channel would determine how the show would be constituted. This would allow adults only scenes to be inserted if appropriate, or more detail on a scene of greater interest to one of the viewer groups. A child's version might dwell more on the children in the program, and so on. It is important to note that a group of set-top boxes 43 can contain as few as one set-top box. This is consistent with the definition of group addressing.

25

EXPRESS MAIL NO.: EL307822463US

5

Another use within the same business model would be to show instructive materials at different levels. For instance, a home maintenance program might include advanced scenes of woodworking for one user, and might require a less advanced viewer to buy a preassembled piece. Since only short segments are different, the ability to assemble this show via play-list 300 at the point of media consumption requires much less bandwidth than the traditional method of having two channels.

10

Although a specific embodiment of the invention has been disclosed, it will be understood by those having skill in the art that changes can be made to this specific embodiment without departing from the spirit and scope of the invention. The scope of the invention is not to be restricted, therefore, to the specific embodiment, and it is intended that the appended claims cover any and all such applications, modifications, and embodiments within the scope of the present invention.

What is claimed is:

15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
335
340
345
350
355
360
365
370
375
380
385
390
395
400
405
410
415
420
425
430
435
440
445
450
455
460
465
470
475
480
485
490
495
500
505
510
515
520
525
530
535
540
545
550
555
560
565
570
575
580
585
590
595
600
605
610
615
620
625
630
635
640
645
650
655
660
665
670
675
680
685
690
695
700
705
710
715
720
725
730
735
740
745
750
755
760
765
770
775
780
785
790
795
800
805
810
815
820
825
830
835
840
845
850
855
860
865
870
875
880
885
890
895
900
905
910
915
920
925
930
935
940
945
950
955
960
965
970
975
980
985
990
995
1000